

What is claimed is:

1. A method for producing a soft magnetic material, comprising:

5 a surface oxidation step of forming oxide films on the surfaces of a soft magnetic powder,

a step of preparing a molding compound of the soft magnetic powder for press-molding the soft magnetic powder,

10 a press molding step of press-molding the molding compound of the soft magnetic powder into a predetermined shape, and

15 a sintering step of sintering the press-molded soft magnetic powder by elevating the temperature of the periphery of the oxide film to near the melting point using a millimeter wave sintering apparatus or a discharge plasma sintering apparatus to produce a soft magnetic material.

2. A method for producing a soft magnetic material, comprising:

20 a surface oxidation step of forming oxide films on the surfaces of a soft magnetic powder,

a step of preparing a molding compound of the soft magnetic powder for press-molding the soft magnetic powder,

25 a press molding and sintering step of sintering a press-molded soft magnetic powder by elevating the temperature of the periphery of the oxide film to near the melting point using a millimeter wave sintering apparatus or a discharge plasma sintering apparatus while press-molding the molding compound of the soft magnetic powder into a predetermined shape to produce a soft magnetic material.

30 35 3. A method for producing a soft magnetic material according to claim 1 or 2, wherein, in the surface oxidation step, the oxide film is formed on the surfaces of the soft magnetic powder by heating the surfaces of the soft magnetic powder in an oxidizing atmosphere using

a millimeter wave sintering apparatus or a discharge plasma sintering apparatus.

4. A method for producing a soft magnetic material according to claim 1 or 2, wherein the soft magnetic powder has an average particle diameter of 0.01 to 10 micrometers.

5 5. A method for producing a soft magnetic material according to claim 1 or 2, wherein the soft magnetic powder contains a Fe-Al alloy, a Fe-Al-Si alloy, a Fe-Si 10 alloy, or Fe as a principal component.

10 6. A method for producing a soft magnetic material according to claim 1 or 2, wherein a Cu base powder is added to a raw material of the soft magnetic powder and the added raw material is pulverized by a grinder in a 15 step of preparing the soft magnetic powder.

7. A method for producing a soft magnetic material according to claim 1 or 2, which further comprises a step 20 of heating a soft magnetic powder in a reducing atmosphere to activate the surfaces of the soft magnetic powder before the surface oxidation step.

25 8. A method for producing a soft magnetic material comprising a surface oxidation step of forming oxide films on the surfaces of a soft magnetic powder, a step of preparing a molding compound of the soft magnetic powder for press-molding the soft magnetic powder, a press molding step of press-molding the molding compound of the soft magnetic powder into a predetermined shape, and a sintering step of sintering the press-molded soft magnetic powder to produce a soft magnetic material, 30 characterized by forming oxide films on the surfaces of the soft magnetic powder by heating the surface of the soft magnetic powder in an oxidizing atmosphere using a millimeter wave sintering apparatus or a discharge plasma sintering apparatus in the surface oxidation step.